

## A new *Cornutrypeta* species from Taiwan with notes on its phylogenetic relationships (Diptera: Tephritidae)

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**Abstract** A new tephritid species, *Cornutrypeta taiwanensis*, is described and illustrated. This is the first record of this rare genus from Taiwan. The type series, two males and two females, were collected in yellow pan traps on the same date and location. The phylogenetic position of the species is discussed based on a cladistic analysis of the genus.

**Key words** Diptera, Tephritidae, Trypetini, *Cornutrypeta*, Phylogeny

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### INTRODUCTION

The genus *Cornutrypeta* Han and Wang is based on nine Palaearctic and Oriental species with enlarged male frontal setae (Han *et al.* 1993). I here report an additional *Cornutrypeta* species from Taiwan, the first record from this country. The type series, which include two males and two females, were collected using yellow pan traps in the same date and location. This discovery is especially interesting, because more than half the previously recorded species of *Cornutrypeta* are known only from male(s). I believe that this additional new species based on both sexes will provide useful insight into sexual dimorphism in *Cornutrypeta*.

In this paper, I describe and illustrate the new species of *Cornutrypeta* and discuss its phylogenetic relationships based on a cladistic analysis. The terminology and taxonomic methods used in this paper follow those of Han (1992) and Han *et al.* (1993).

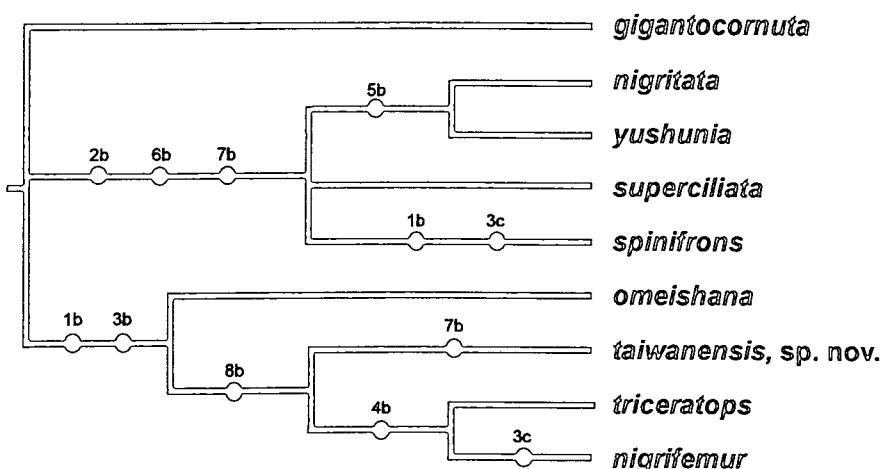
### RELATIONSHIPS

Han *et al.* (1993) provided a cladogram for *Cornutrypeta* species in the latest revision. I reexamine these relationships in light of the new species. I have used same characters and character states as in my previous work. The character state distribution for the new species to be added in table 1 of Han *et al.* (1993) is b ? b a a a b b (=states for character 1 through 8).

An exhaustive search setting in the PAUP package (Swofford 1993) yielded six most parsimonious trees. A strict consensus trees is shown in Fig. 1. The topology is identical to that of Han *et al.* (1993)

except that the new species, *C. taiwanensis*, is recognized as a sister species of the *C. triceratops* and *C. nigrifemur* clade. Monophyly of these three species are supported based on a single synapomorphy (abdominal tergite 5 with a pair of dark brown lateral spots). Although not used in the phylogenetic analysis, it is interesting to note that the wing pattern of *C. taiwanensis* (Figs 6, 7) is almost identical to that of *C. nigrifemur* and similar to that of *C. triceratops*.

Of these three species, closer relationship between *C. triceratops* and *C. nigrifemur* is inferred based on the blunt third frontal setae in males.



**Fig. 1.** Revised cladogram of *Cornutrypeta* spp. Strict consensus tree of six most parsimonious trees found through exhaustive search setting of PAUP package (tree length = 12, consistency index = 0.750, homoplasy index = 0.250, retention index = 0.842, rescaled consistency index = 0.632). Numbers and letters on branches refer to characters and states representing inferred apomorphic changes based on the ACCTRAN hypothesis of PAUP package.

#### *Cornutrypeta taiwanensis* Han, sp. nov.

**Diagnosis.** Both sexes are easily distinguished from other *Cornutrypeta* species by their dark antennae, which contrast well with the yellow brown frontal area. Beside their sexually dimorphic frontal structure (Figs 2, 3), which is characteristic of *Cornutrypeta*, wing pattern appears to be also sexually dimorphic (Figs 6, 7). More samples, however, are needed to confirm whether this indeed is dimorphism or simply is due to inadequate sampling of a variable character.

**Description.** Body yellow brown to orange brown ground color with dark brown setae; wing length 5.06~5.36 mm. Male head (Fig. 2) entirely yellow to orange brown with frontal-head ratio 0.42~0.44, eye ratio 0.78~0.79, genal-eye ratio 0.23~0.26; inner vertical seta as long as longest diameter of eye; outer vertical seta 0.5~0.6x as long as inner vertical seta; postocellar seta 0.3~0.7x as long as inner vertical seta; paravertical seta slightly shorter than postocellar seta; ocellar triangle dark brown; ocellar seta very fine, shorter than ocellar triangle; frons orange brown with sparse, fine, dark brown setulae; 1 fine orbital seta; 4 frontal setae highly modified, pointed apically; 1st and 2nd frontal setae

large, as long as head height; 3rd frontal seta 0.6x as long as 1st seta; 4th seta 0.8x as long as 1st seta; frontal plate sharply raised around bases of frontal setae; aristal-antennal ratio 1.6~1.75; antennae closely situated each other, dark brown, contrasting well with yellow brown frontal area; scape and pedicel with dark brown setulae; arista short pubescent; face yellow brown; parafacial 0.3~0.4x as wide as flagellomere 1; facial ridge almost bare; genal seta fine but distinct, dark brown; postgena strongly swollen with fine, dark brown setulae; postocular setae extended 0.5~0.6x distance from upper eye margin to lower eye margin. Female head similar to that of male without frontal modification (Fig. 3); frontal-head ratio 0.38~0.42, eye ratio 0.79~0.80, genal-eye ratio 0.18~0.20, aristal-antennal ratio 1.57~1.71; 2 orbital setae; 3 frontal setae; parafacial 0.25x as wide as flagellomere 1. Thorax yellow brown to orange brown in ground color; scutum subshiny with short and fused, dark brown anterior submesal spots; scapula setae hairlike, not well distinguished from other setulae nearby; dorsocentral setae about same level as postsutural supra-alar seta; scutellum almost bare, slightly convex with basal setae 3x as long as scutellum; apical setae 2.6~2.7x as long as scutellum, crossing each other in middle; proepisternum covered with fine, dark brown setulae; anepisternum with 2 setae with lower one 0.5x as long as upper one; mediotergite shiny, dark brown except upper half of subscutellum. Legs entirely orange brown with dark brown setae and setulae; fore femur with 6~7 posteroventral setae. Wing (Figs 6, 7) hyaline with dark brown pattern; pattern more extensive in females; wing-thorax ratio 2.8~3.1, vein R4+5 ratio 2.6~2.9, vein M ratio 1.0~1.1, subcostal-costal ratio 0.4~0.5; R4+5 only with 2~3 tiny setulae on node. Male abdomen 1.4x as long as wide (Fig. 4); shiny, yellow brown to orange brown ground color with dark brown setae and setulae; tergite 3~5 each with large triangular dark brown lateral specks; epandrium dark brown with dark brown setulae; surstyli brown with dark brown apex; outer surstyli with both anterior and posterior lobe angulated, somewhat truncate apically in lateral view (Fig. 9); inner surstyli with subapical prensiseta much smaller than apical prensiseta (Fig. 8); aedeagal apodeme wide, fan shaped; distiphallus with apicodorsal rod small (Fig. 10); median granulate sclerite elliptic in outline; dorsal sclerite with pattern of closely approximated, narrowly oblong cells. Female preabdomen (Fig. 5) similar to that of male with tergite 2~6 each with dark brown lateral specks; oviscape (Fig. 11) dark brown with dark brown setulae, with a pair of short apico-ventral setae, no dorsal setae; eversible membrane with taeniae about half as long as total length of membrane, medially with strong triangular teeth, posteriorly with tiny triangular teeth; aculeus (Fig. 12) wide, parallel-sided, apical 3/7 tapered with fine lateral serrations; 3 spermathecae (Fig. 13) ovate with one smaller than others, dark brown with transverse spinular pattern; apical portion of spermathecal duct slightly swollen. Egg narrowly elliptic in outline with tiny micropylar end (Fig. 14).

*Type Data.* Holotype ♂, Kaohsiung Hsien, Kuanshan trail at Kuanshanchi River, 2,400 m, Taiwan, collected in yellow pan traps, A. Smetana. Paratypes: 1 ♂, 2 ♀, same data as holotype. The type series are deposited in the Carnegie Museum, Pittsburgh, Pennsylvania, U.S.A.

*Distribution.* Known only from the type locality, Taiwan.

*Etymology.* The specific epithet is derived from the type locality, Taiwan.

## ACKNOWLEDGMENTS

I thank B. A. McPheron for reviewing the manuscript. I am also indebted to C. W. Young for the loan of the type material.

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Swofford, D. L., 1993. PAUP (Phylogenetic Analysis Using Parsimony), version 3.1. Copyrighted by Illinois Natural History Survey and Smithsonian Institution [software].

대만산 *Cornutrypeta* 속 (파리目: 과실파리科)의  
신종기재 및 계통학적 유연관계 고찰

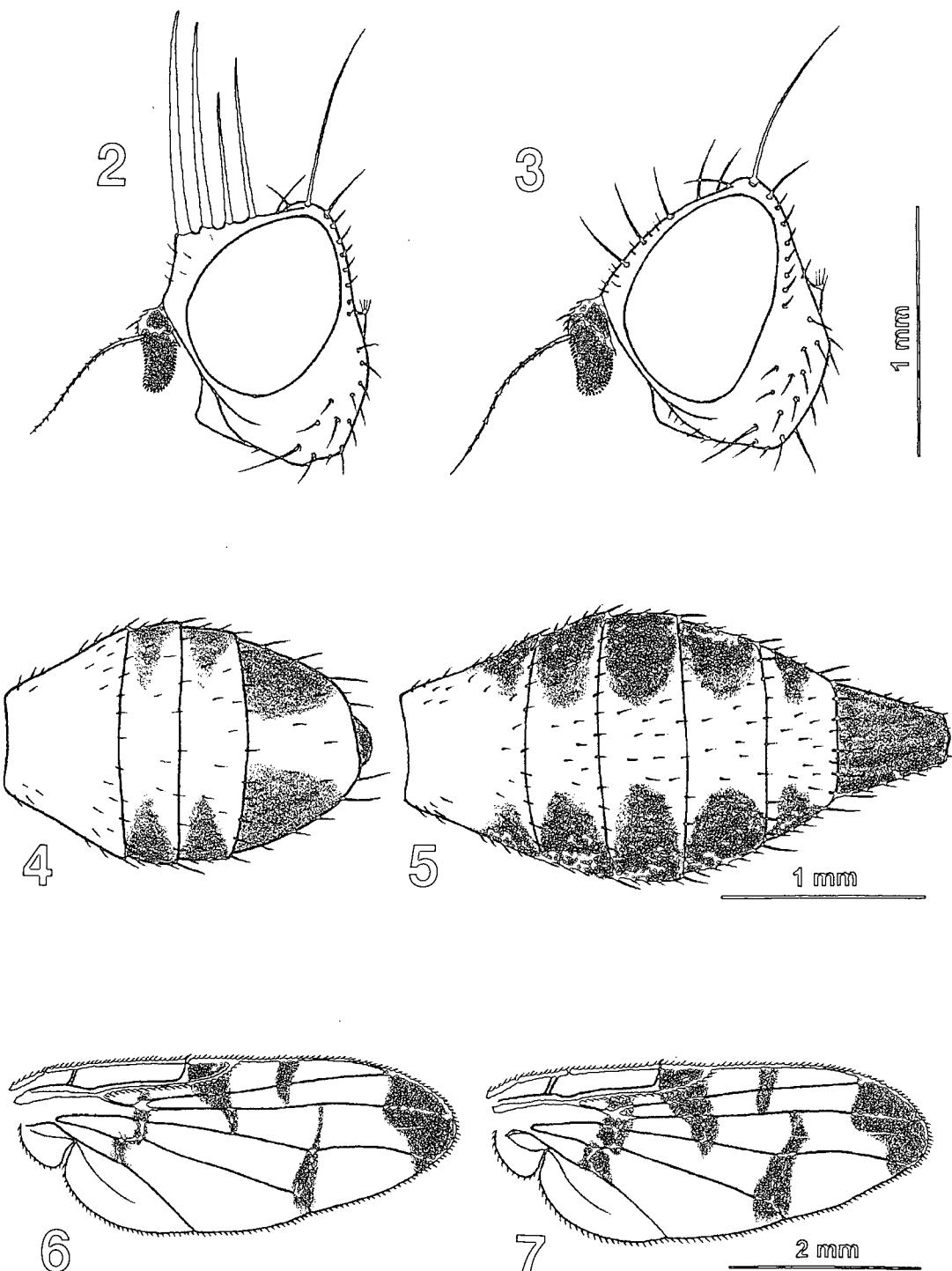
한 호연

연세대학교 문리대학 생명과학과

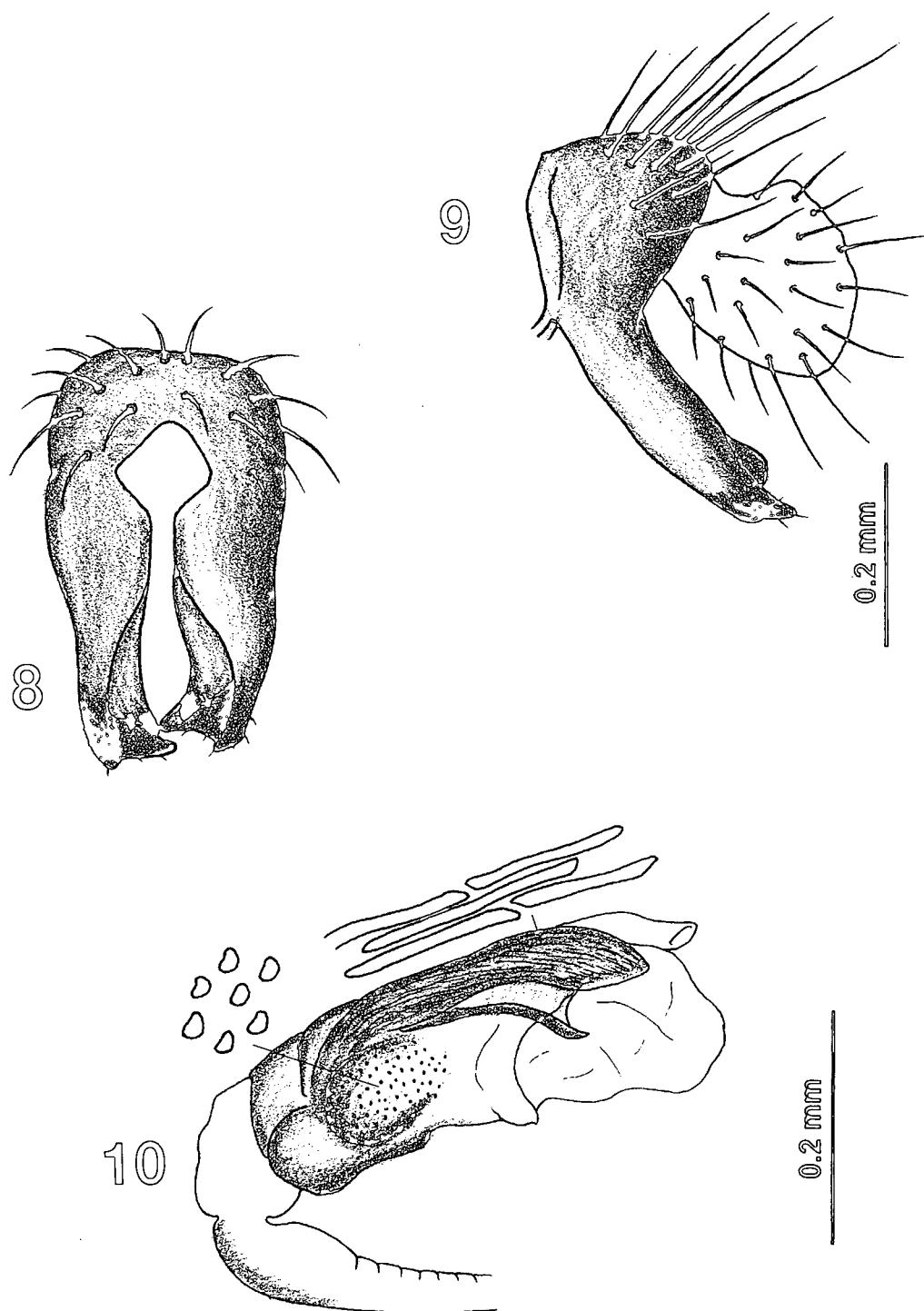
대만산 과실파리과의 신종, *Cornutrypeta taiwanensis*를 그림과 함께 기재한다. 이 종은 대만에서 최초로 기록되는 *Cornutrypeta* 속이며, 노랑접시트랩을 사용하여 동일 지역에서 채집한 각각 2개체씩의 수컷과 암컷들을 모식표본으로 선정하였다. 이 종의 계통학적 유연관계는 분지학적인 방법론을 사용하여 추정하였다.

검색어 : 파리목, 과실파리과, 참과실파리족, *Cornutrypeta*, 대만

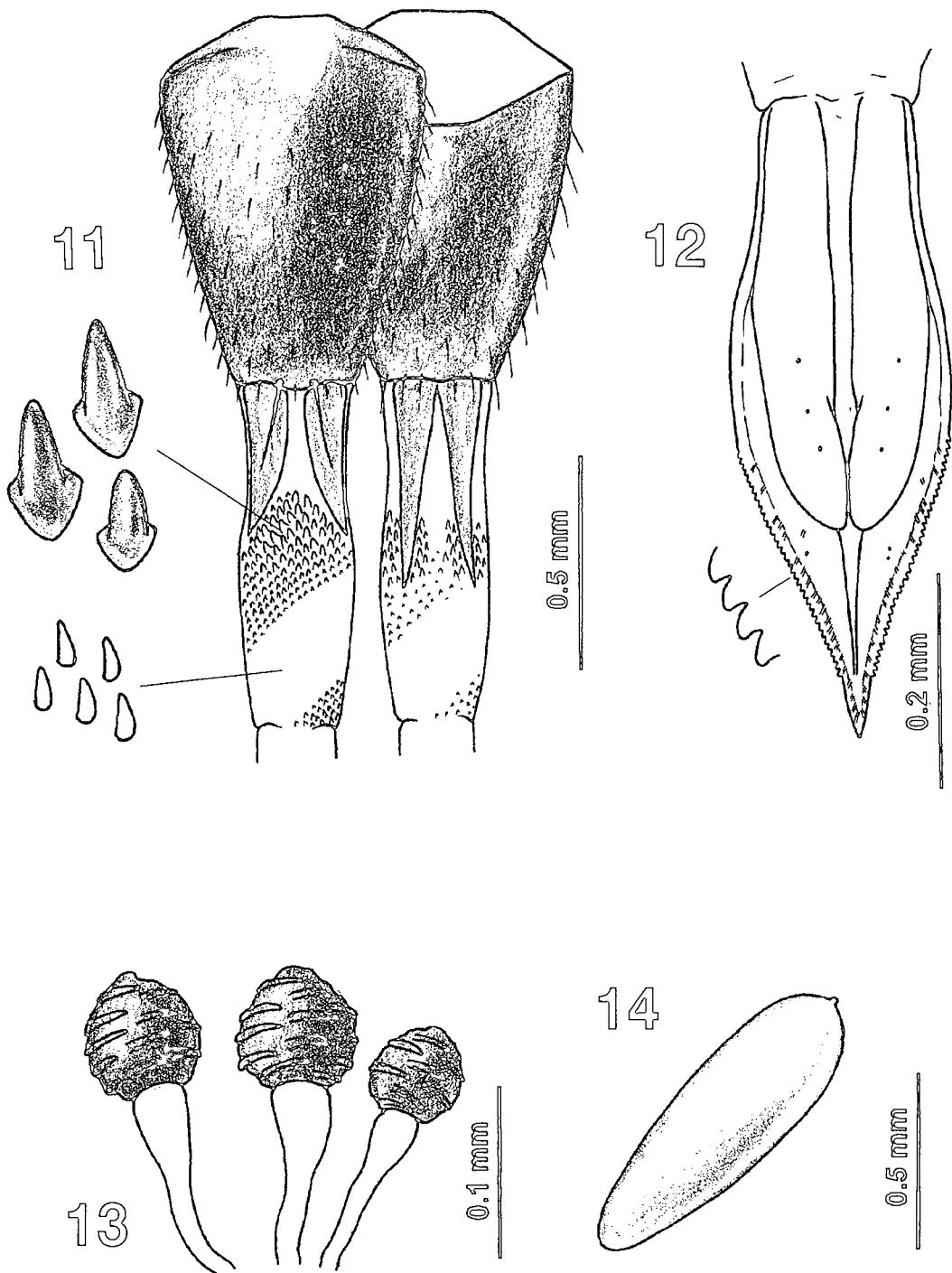
(Received: 5 August 1996)  
(Accepted: 31 August 1996)



Figs 2-7. *Cornutrypeta taiwanensis*, sp. nov. (2) male head, lateral view; (3) female head, lateral view; (4) male abdomen, dorsal view; (5) female abdomen, dorsal view; (6) male wing; (7) female wing.



**Figs 8-10.** *Cornutrypeta taiwanensis*, sp. nov. (8) epandrial complex with cerci removed, caudal view; (9) epandrial complex, lateral view; (10) distiphallus, lateral view (insets show detail, about 7x of original figures).



**Figs 11-14.** *Cornutrypeta taiwanensis*, sp. nov. (11) female postabdomen with aculeus removed, ventral and dorsal view (insets about 10x of original figure); (12) aculeus, ventral view (inset about 10x of original figure); (13) spermathecae; (14) egg.